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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

APPLICANT(S) Xiaodong Huang, Andreas Stintz, Kevin Malloy, Guangtian Liu,
Luke Lester and Julian Cheng

PATENT NO.: 6,782,021 B2

ISSUE DATE: August 24, 2004

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FILING DATE: March 1, 2002

TITLE: Quantum Dot Vertical Cavity Surface Emitting Laser

ATTY. DKT. NO.: 22920-06460

Certificate
OCT 05 2004
of Correction

CERTIFICATE OF MAILING

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Dated: SEPT. 27, 2004

By: *Michael W. Farn*
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ATTENTION: DECISION AND CERTIFICATE OF CORRECTION
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REQUEST FOR CERTIFICATE OF CORRECTION

SIR:

The following errors, as more fully described below, appear in this patent.

☒ The Applicant submits that no fee is due for correction of the errors made by the Patent and Trademark Office; OR,

☐ The errors occurred in good faith. Correction thereof does not involve such changes in the patent as would constitute new matter or would require re-examination. A

Certificate of Correction is requested. Enclosed herewith is payment in the amount of \$100.00 to cover the fee for this Certificate of Correction.

Attached hereto are duplicate Forms PTO-1050, with at least one copy that is suitable for printing.

Applicant kindly requests the following changes:

Title Page,

Item [56], **References Cited**, U.S. PATENT DOCUMENTS, add:

--	5,608,229 A	03/1997	Mukai et al.	257	/14
	5,781,575 A	07/1998	Nilsson	372	/50
	5,930,278 A	07/1999	Menigaux	372	/50 --

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These references appeared in Information Disclosure Statements initialed by the Examiner on 02/03/2004 and attached to the Notice of Allowance dated 02/18/2004, copies of which are attached hereto as Exhibit A. All of these errors are typographical errors.

Please send the Certificate to:
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Respectfully submitted,
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Dated: Sept. 27, 2004

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UNITED STATES PATENT AND TRADEMARK OFFICE
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PATENT NO. : 6,782,021 ~~B2~~

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INVENTOR(S) : Xiaodong Huang, Andreas Stintz, Kevin Malloy, Guangtian Liu, Luke Lester
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PATENT NO. 6,782,021 *B2*

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,782,021 *B2*

DATED : August 24, 2004

INVENTOR(S) : Xiaodong Huang, Andreas Stintz, Kevin Malloy, Guangtian Liu, Luke Lester
and Julian Cheng

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page, OTHER PUBLICATIONS (cont.):

Prieto, J.A.; Armelles, G.; Priester, C.; Garcia, J.M.; Gonzalez, L.; and Garcia, R.; *Strain-Induced Optical Anisotropy In Self-Organized Quantum Structures At The E_1 Transition*; Applied Physics Letters; Vol. 76, No. 16; April 17, 2000; pp. 2197-2199.

Qiu, Y.; Gogna, P.; Forouhar, S.; Stintz, A.; and Lester, L.F.; *High-Performance InAs Quantum Dot Lasers Near 1.3 μm* ; Applied Physics Letters; Vol. 79, Number 22; November 26, 2001; pp. 3570-3572.

Qiu, Y.; Gogna, P.; and Forouhar, S.; *High Temperature Continuous Wave Operation Of InAs Quantum Dot Lasers Near 1.3 μm* ; Conference: IEEE Lasers & Electro-Optics Society; LEOS Conference; November 12-16, 2001; pp. 267-268.

Sakaki, Hiroyuki; *Quantum Wires, Quantum Boxes And Related Structures; Physics, Device Potentials And Structural Requirements*; Surface Science; Vol. 267; 1992; pp.623-629.

Shernyakov, Yu.M.; Bedarev, D.A.; Kondrat'eva, E.Yu.; Kop'ev, P.S.; Kovsh; A.R.; Maleev, N.A.; Maximov, M.V.; Mikhlin, S.S.; Tsatsul'nikov, A.F.; Ustinov, V.M.; Volovik, B.V.; Zhukov, A.E.; Alferov, Zh.I.; Ledentsov, N.N.; and Bimberg, D.; *1.3 μm GaAs-Based Laser Using Quantum Dots Obtained By Activated Spinodal Decomposition*; Electronics Letters; Vol. 35, No. 11; May 27, 1999; pp. 898-900.

Shoji, H.; Mukai, K.; Ohtsuka, N.; Sugawara, M.; Uchida, T.; and Ishikawa, H.; *Lasing At Three-Dimensionally Quantum-Confined Sublevel Of Self-Organized $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}$ Quantum Dots By Current Injection*; IEEE Photonics Technology Letters, Vol. 7, No. 12; December 1995; pp. 1385-1387.

MAILING ADDRESS OF SENDER:

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J.Vac.Sci.Technol.; Vol. B 18(3); May/Jun 2000; pp.1496-1501.

Stintz, A.; Liu, G.T.; Li, H.; Lester, L.F.; and Malloy, K.J.; *Low-Threshold Current
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593.

Tabuchi, H.; and Ishikawa H.; *External Grating Tunable MQW Laser With Wide
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Thomson, J.D.; Herrmann, E.; Summers, H.D.; Smowton, P.M.; and Hopkinson, M.;
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Ustinov, V.M.; Maleev, N.A.; Zhukov, A.E.; Kovsh, A.R.; Egorov, A.Yu.; Lunev,
A.V.; Volovik, B.V.; Krestnikov, I.L.; Musikhin, Yu.G.; Bert, N.A.; Kop'ev, P.S.;
and Alferov, Zh.I.; *InAs/InGaAs Quantum Dot Structures On GaAs Substrates
Emitting at 1.3μm*; Applied Physics Letters; Vol. 74, No. 19; May 10, 1999; pp.
2815-2817.

Varangis, P.M.; Li, H.; Liu, G.T.; Newell, T.C.; Stintz, A.; Fuchs, B.; Malloy, K.J.;
and Lester, L.F.; *Low-Threshold Quantum Dot Lasers With 201nm Tuning Range*;
Electronics Letters; Vol. 36, No. 18; August 31, 2000.

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Varangis, P.M.; Li, H.; Liu, G.T.; Newell, T.C.; Stintz, A.; Fuchs, B.; Malloy, K.J.; and Lester, L.F.; *183 nm Tuning Range In A Grating-Coupled External-Cavity Quantum Dot Laser*; IEEE 2000 International Semiconductor Laser Conference; pp. 137-138.

Wang, R.H.; Stintz, A.; Rotter, T.J.; Malloy, K.J.; and Lester, L.F.; *Low Threshold Oxide-Confined InAs Quantum Dash Ridge Waveguide Lasers On InP Substrates*; Conference: IEEE Lasers & Electro-Optics Society; LEOS Conference; November 12-16, 2001; pp. 405-406.

Wang, R.H.; Stintz, A.; Varangis, P.M.; Newell, T.C.; Li, H.; Malloy, K.J.; and Lester, L.F.; *Room-Temperature Operation Of InAs Quantum-Dash Lasers On InP (001)*; IEEE Photonics Technology Letters; Vol. 13, No. 8; August 2001; pp. 767-769.

Wang, Ronghua; Stintz, A.; Varangis, P.M.; Newell, T.C.; Li, H.; Lester, L.F.; and Malloy, K.J.; *1.6 μ m Single And Multiple-Stack Room Temperature Quantum Dash Lasers On InP*; Conference: CLEO (Conference On Lasers And Electro Optics)/QELS Plenary Session And Awards Ceremony; May 9, 2001.

Wang, Zhanguo; Liu, Fengqi; Liang, Jiben; and Xu, Bo; *Self-Assembled InAs/GaAs Quantum Dots And Quantum Dot Laser*; Science in China; Vol. 43, No. 8; August 2000; pp. 861-870.

Wasilewski, Z.R.; Fafard, S.; and McCaffrey J.P.; *Size And Shape Engineering Of Vertically Stacked Self-Assembled Quantum Dots*; Journal Of Crystal Growth; Vol. 201, 202; 1999; pp. 1131-1135.

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Title Page, OTHER PUBLICATIONS (cont.):

Willatzen, M.; Tanaka, T.; Arakawa, Y.; and Singh, J.; *Polarization Dependence Of Optoelectronic Properties In Quantum Dots And Quantum Wires – Consequences Of Valence-Band Mixing*; IEEE Journal of Quantum Eletronics; Vol. 30, No. 3; March 1994; pp. 640-653.

Zhukov, A.E.; Kovsh, A.R.; Egorov, A.Yu.; Maleev, N.A., Ustinov, V.M.; Volovik, B.V.; Maksimov, M.V.; Tsatsul'nikov, A.F.; Ledenstov, N.N.; Shernyakov, Yu.M.; Lunev, A.V., Musikhin, Yu.G.; Bert, N.A.; Kop'ev, P.S.; and Alferov, Zh.I.; *Photo And Electoluminescence In The 1.3 μ m Wavelength Range From Quantum-Dot Structures Grown On GaAs Substrates*; Semiconductors; Vol. 33, No. 2; February 1999; pp. 153-156.

--

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Sheet 7 of 7

FORM PTO-1449 (REV. 6-89)		U.S. DEPARTMENT OF COMMERCE Patent and Trademark Office		Attorney's Docket No. 22920-06460	Serial No. 10/087,408
INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)				Applicant Xiaodong Huang et al.	
				Filing Date March 1, 2002	
Group Art Unit Unassigned					
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)					
JD	80	Varangis, P.M.; Li, H.; Liu, G.T.; Newell, T.C.; Stintz, A.; Fuchs, B.; Malloy, K.J.; and Lester, L.F.; 183 nm Tuning Range In A Grating-Coupled External-Cavity Quantum Dot Laser, IEEE 2000 International Semiconductor Laser Conference; pp. 137-138.			
JD	81	Wang, R.H.; Stintz, A.; Rotter, T.J.; Malloy, K.J.; and Lester, L.F.; Low Threshold Oxide-Confined InAs Quantum Dash Ridge Waveguide Lasers On InP Substrates; Conference: IEEE Lasers & Electro-Optics Society; LEOS Conference; November 12-16, 2001; pp. 405-406.			
JD	82	Wang, R.H.; Stintz, A.; Varangis, P.M.; Newell, T.C.; Li, H.; Malloy, K.J.; and Lester, L.F.; Room-Temperature Operation Of InAs Quantum-Dash Lasers On InP (001); IEEE Photonics Technology Letters; Vol. 13, No. 8; August 2001; pp. 767-769.			
JD	83	Wang, Ronghua; Stintz, A.; Varangis, P.M.; Newell, T.C.; Li, H.; Lester, L.F.; and Malloy, K.J.; 1.6 μ m Single And Multiple-Stack Room Temperature Quantum Dash Lasers On InP; Conference: CLEO (Conference On Lasers And Electro Optics)/QELS Plenary Session And Awards Ceremony; May 9, 2001.			
JD	84	Wang, Zhanguo; Liu, Fengqi; Liang, Jiben; and Xu, Bo; Self-Assembled InAs/GaAs Quantum Dots And Quantum Dot Laser, Science in China; Vol. 43, No. 8; August 2000; pp. 861-870.			
JD	85	Wasilewski, Z.R.; Fafard, S.; and McCaffrey J.P.; Size And Shape Engineering Of Vertically Stacked Self-Assembled Quantum Dots; Journal Of Crystal Growth; Vol. 201, 202; 1999; pp. 1131-1135.			
JD	86	Willatzen, M.; Tanaka, T.; Arakawa, Y.; and Singh, J.; Polarization Dependence Of Optoelectronic Properties In Quantum Dots And Quantum Wires - Consequences Of Valence-Band Mixing; IEEE Journal of Quantum Electronics; Vol. 30, No. 3; March 1994; pp. 640-653.			
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EXAMINER		DATE CONSIDERED 2/02/04			
EXAMINER: Initial if references considered, whether or not citation is in conformance with MPEP § 609; Draw line through citation if not in conformance and not considered.					
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Exhibit A

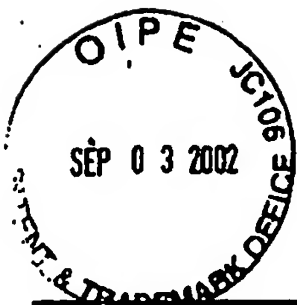


Sheet 6 of 7

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INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)				Applicant Xiaodong Huang et al.	
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Group Art Unit Unassigned					
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)					
JD	67	Park, Gyoungwon; Shchekin, Oleg B.; Csutak, Sebastian; Huffaker, Diana L.; and Deppe, Dennis G.; <i>Room-Temperature Continuous-Wave Operation Of A Single-Layered 1.3μm Quantum Dot Laser</i> , Applied Physics Letters, Vol. 75, No. 21; November 22, 1999; pp. 3267-3269.			
JD	68	Prieto, J.A.; Armelles, G.; Priester, C.; Garcia, J.M.; Gonzalez, L.; and Garcia, R.; <i>Strain-Induced Optical Anisotropy In Self-Organized Quantum Structures At The E₁ Transition</i> ; Applied Physics Letters; Vol. 76, No. 16; April 17, 2000; pp. 2197-2199.			
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JD	70	Qiu, Y.; Gogna, P.; and Forouhar, S.; <i>High Temperature Continuous Wave Operation Of InAs Quantum Dot Lasers Near 1.3 μm</i> ; Conference: IEEE Lasers & Electro-Optics Society; LEOS Conference; November 12-16, 2001; pp. 267-268.			
JD	71	Sakaki, Hiroyuki; <i>Quantum Wires, Quantum Boxes And Related Structures; Physics, Device Potentials And Structural Requirements</i> ; Surface Science; Vol. 267; 1992; pp.623-629.			
JD	72	Shernyakov, Yu.M.; Bedarev, D.A.; Kondrat'eva, E.Yu.; Kop'ev, P.S.; Kovsh, A.R.; Maleev, N.A.; Maximov, M.V.; Mikhlin, S.S.; Tsatsul'nikov, A.F.; Ustinov, V.M.; Volovik, B.V.; Zhukov, A.E.; Alferov, Zh.I.; Ledentsov, N.N.; and Bimberg, D.; <i>1.3μm GaAs-Based Laser Using Quantum Dots Obtained By Activated Spinodal Decomposition</i> ; Electronics Letters; Vol. 35, No. 11; May 27, 1999; pp. 898-900.			
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JD	74	Stintz, A.; Liu, G.T.; Gray, A.L.; Spillers, R.; Delgado, S.M.; and Malloy, K.J.; <i>Characterization Of InAs Quantum Dots In Strained In_xGa_{1-x}As Quantum Wells</i> ; J.Vac.Sci.Technol.; Vol. B 18(3); May/Jun 2000; pp.1496-1501.			
JD	75	Stintz, A.; Liu, G.T.; Li, H.; Lester, L.F.; and Malloy, K.J.; <i>Low-Threshold Current Density 1.3-μm InAs Quantum-Dot Lasers With The Dots-In-A-Well (DWELL) Structure</i> ; IEEE Photonics Technology Letters; Vol. 12, No. 6; June 2000; pp. 591-593.			
JD	76	Tabuchi, H.; and Ishikawa H.; <i>External Grating Tunable MQW Laser With Wide Tuning Range Of 240nm</i> ; Electronic Letters; Vol. 26, No. 11; May 24, 1990; pp. 742-743.			
JD	77	Thomson, J.D.; Herrmann, E.; Summers, H.D.; Smowton, P.M.; and Hopkinson, M.; <i>Temperature Insensitive Quantum Dot Structures For Vertical Cavity Lasers</i> ; CLEO 2000 Conference; May 2000; pp. 347-348.			
JD	78	Ustinov, V.M.; Maleev, N.A.; Zhukov, A.E.; Kovsh, A.R.; Egorov, A.Yu.; Lunev, A.V.; Volovik, B.V.; Krestnikov, I.L.; Musikhin, Yu.G.; Bert, N.A.; Kop'ev, P.S.; and Alferov, Zh.I.; <i>InAs/InGaAs Quantum Dot Structures On GaAs Substrates Emitting at 1.3μm</i> ; Applied Physics Letters; Vol. 74, No. 19; May 10, 1999; pp. 2815-2817.			
JD	79	Varangis, P.M.; Li, H.; Liu, G.T.; Newell, T.C.; Stintz, A.; Fuchs, B.; Malloy, K.J.; and Lester, L.F.; <i>Low-Threshold Quantum Dot Lasers With 201nm Tuning Range</i> ; Electronics Letters; Vol. 36, No. 18; August 31, 2000.			
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Sheet 5 of 7

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INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)		Applicant Xiaodong Huang et al.	
		Filing Date March 1, 2002	Group Art Unit Unassigned

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

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JD	66	Park, G.; Shchekin, O.B.; Huffaker, D.L.; and Deppe, D.G.; <i>Very Low Threshold Oxide-Confined 1.3 μm GaAs-Based Quantum Dot Laser</i> ; CLEO 2000 Conference; May 2000; pp. 349-350.

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Substitute for form 1449A/PTO				Complete If Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application No.	10/087,408
				Filing Date	March 1, 2002
				First Named Inventor	Xiaodong Huang
				Art Unit	2828
				Examiner Name	James W. Davie
Sheet	2	of	2	Attorney Docket Number	22920-06460

OTHER REFERENCES – NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials ¹	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
JD	8	Park, Gyoungwon et al., "Temperature Dependence of Gain Saturation in Multilevel Quantum Dot Lasers," <i>IEEE Journal of Quantum Electronics</i> , IEEE Inc., New York, U.S., Vol. 36, No. 9, September 2000, pages 1065-1071.	
JD	9	Saito, Hideaki et al., "Controlling polarization of quantum-dot surface-emitting lasers by using structurally anisotropic self-assembled dots," <i>Applied Physics Letters</i> , American Institute of Physics, New York, U.S., Vol. 71, No. 5, August 4, 1997, pages 590-592.	
JD	10	Schur, Richard et al., "Vertical Microcavity Lasers with InGaAs/GaAs Quantum Dots Formed by Spinodal Phase Separation," <i>Japanese Journal of Applied Physics</i> , Tokyo, Japan, Vol. 36, No. 3B, March 15, 1997, pages 357-360.	
JD	11	Shchekin, Oleg B. et al., "Low-Threshold Continuous-Wave Two-Stack Quantum-Dot Laser with Reduced Temperature Sensitivity," <i>IEEE Photonics Technology Letters</i> , IEEE Inc., New York, U.S., Vol. 12, No. 9, September 2000, pages 1120-1122.	
JD	12	Ustinov, V.M. et al., "High output power CW operation of a quantum dot laser," <i>Compound Semiconductors 1999, Proceedings of the 26th International Symposium on Compound Semiconductors</i> , Berlin, Germany, August 22-26, 1999, Institute of Physics Conference Series, IOP Publishing Ltd., London, G.B., No. 166, pages 277-280.	
JD	13	PCT International Search Report, International Application No. PCT/US01/31256, May 27, 2003, 7 pages.	
JD	14	PCT International Search Report, International Application No. PCT/US02/06221, May 27, 2003, 4 pages.	

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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT****Complete if Known**

Application No.	10/087,408
Filing Date	March 1, 2002
First Named Inventor	Xiaodong Huang
Art Unit	2828
Examiner Name	James W. Davie
Attorney Docket Number	22920-06460

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U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document No. Number - Kind Code ² (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
JD	1	US-5,608,229 A	03-04-1997	Mukai et al.

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Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ³ - Number ⁴ Kind Code ⁵ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	T ⁶

OTHER REFERENCES - NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ⁶
JD	2	Komori, Kazuhiro et al., "Noise Study of Low-Dimensional Quantum-Well Semiconductor Laser Amplifiers," <i>IEEE Journal of Quantum Electronics</i> , IEEE Inc., New York, US, Vol. 28, No. 9, September 1, 1992, pages 1894-1900.	
JD	3	Saito, Hideaki et al., "Room-temperature lasing operation of a Quantum-dot vertical-cavity surface-emitting laser," <i>Applied Physics Letters</i> , "American Institute of Physics, New York, US, Vol. 69, No. 21, November 18, 1996, pages 3140-3142.	
JD	4	Utzmeier, T. et al., "Growth and characterization of self-organized InSb quantum dots and quantum dashes," <i>Journal of Crystal Growth</i> , North-Holland Publishing Co., Amsterdam, The Netherlands, Vol. 175-176, May 1, 1997, pages 725-729.	
JD	5	PCT International Search Report, International Application No. PCT/US01/29561, June 6, 2003, 7 pages.	

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22920/06460/DOCS/1359230.1

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,782,021

DATED : August 24, 2004

INVENTOR(S) : Xiaodong Huang, Andreas Stintz, Kevin Malloy, Guangtian Liu, Luke Lester
and Julian Cheng

It is certified that error appears in the above-identified patent and that said Letters
Patent is hereby corrected as shown below:

Title Page,

Item [56], **References Cited**, U.S. PATENT DOCUMENTS, add:

--	5,608,229 A	03/1997	Mukai et al.	257 /14
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Title Page, OTHER PUBLICATIONS (cont.):

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Title Page, OTHER PUBLICATIONS (cont.):

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Title Page, OTHER PUBLICATIONS (cont.):

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